IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Before the Board of Patent Appeals and Interferences

In re Patent Application of: Atty Dkt. 839-854
C# M#

TONG et al Group Art Unit: 2834

Serial No. 09/728,919 Examiner: Lam, Thanh

Filed: December 1, 2000 Date: May 22, 2003

Title: GENERATOR MAGNETIC ARMATURE WEDGE AND METHOD FOR INCREASING SUBTRANSIENT REACTANCE OF A GENERATOR

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

☐ **Correspondence Address Indication Form Attached.**

☐ **NOTICE OF APPEAL**
Applicant hereby appeals to the Board of Appeals from the decision dated _____ of the Examiner twice/finally rejecting claims _____ ($ 320.00) $

☒ An appeal **BRIEF** is attached in triplicate in the pending appeal of the above-identified application ($ 320.00) $ 320.00

☐ Credit for fees paid in prior appeal without decision on merits -$ ( )

☐ A reply brief is attached in triplicate under Rule 193(b) **(no fee)**

☐ Petition is hereby made to extend the current due date so as to cover the filing date of this paper and attachment(s) **($110.00/1 month**; $410.00/2 months; **$930.00/3 months**; $1450.00/4 months) $

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Any future submission requiring an extension of time is hereby stated to include a petition for such time extension. The Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, in the fee(s) filed, or asserted to be filed, or which should have been filed herewith (or with any paper hereafter filed in this application by this firm) to our **Account No. 14-1140.** A duplicate copy of this sheet is attached.

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In re Patent Application of

TONG et al — Atty. Ref.: 839-854

Serial No. 09/728,919 — Group: 2834

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For: GENERATOR MAGNETIC ARMATURE WEDGE AND METHOD FOR INCREASING SUBTRANSIENT REACTANCE OF A GENERATOR

* *

May 22, 2003

Assistant Commissioner for Patents
Washington, DC 20231

APPEAL BRIEF

Sir:

Applicant submits herewith their Brief on Appeal in triplicate as required by 37 CFR §1.192.

1. REAL PARTY IN INTEREST

The real party in interest is the Assignee of record, GENERAL ELECTRIC COMPANY.

2. RELATED APPEALS AND INTERFERENCES

On information and belief, there are no other appeals or interferences which will directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

3. STATUS OF CLAIMS

Claims 1-11 and 20-30 remain pending in this application. Claims 1, 2, 10, 11, 20 and 28-29 stand rejected by the Examiner. Claims 4-9 and 22-27 are withdrawn from consideration as drawn to a non-elected species. Claims 3 and 21 stand objected to as being dependent upon a rejected base claim but would be allowable if rewritten independent form. A copy of rejected claims 1, 2, 10, 11, 20 and 28-29 is attached hereto as Appendix A. Independent claim 30 received no rejection over the prior art in the final official action of January 3, 2003 and it is therefore submitted that claim 30 has been determined to be allowable over the record prior art. However, for information and reference claim 30 is included in Appendix A.

4. STATUS OF AMENDMENTS

No amendments after final have been filed following the Examiner's final rejection of January 3, 2003. A Request for Reconsideration under Rule 116 was filed on February 19, 2003. In an Advisory Action mailed March 19, 2003 the Examiner advised that the Request for Reconsideration had been considered but did not place the application in condition for allowance.

5. SUMMARY OF THE INVENTION

The present invention provides a way to increase generator subtransient reactance without having to redesign the armature winding or the generator.

Conventional armature coil slot wedges serve to contain the armature bars in the slots. A wedge slide with a varying thickness is inserted between the armature wedge and the top filler to tightly hold all armature coil components inside the slot. By redesigning the armature wedge and/or the slide as a so-called "magnetic flux bridge", in accordance with the invention, the armature slot leakage flux can be significantly

increased and, in turn, the armature slot leakage reactance can be increased (page 2, lines 13-19).

Thus, the invention may be embodied in a magnetic assembly for being received in an armature slot 14 for retaining armature coil components 18,20 therewithin, said assembly having a longitudinal dimension generally parallel to an axis of said armature slot and a thickness dimension in a direction generally perpendicular to said longitudinal dimension and aligned in a depth direction of said armature slot, said magnetic assembly comprising: a magnetic armature wedge structure 10,110,210,310,410 including a molded body having a magnetic core and a resin part encapsulating said magnetic core 24,26,28,30,32, said magnetic core disposed to extend along substantially an entire length thereof (page 4, lines 16-20).

In an exemplary embodiment, a magnetic wedge slide 12 is disposed adjacent said magnetic armature wedge structure 10, 110, 210, 310, 410, between said magnetic armature wedge structure and said armature coil components 18, 20, said magnetic wedge slide being formed from resin having ferromagnetic particles distributed therethrough (page 5, lines 17-19).

In one embodiment, the magnetic core encapsulated in said resin part of said magnetic armature wedge structure 110 comprises a pair of oppositely wound wires 24,26 attached at respective ends (page 4, line 27- page 5, line 3).

In an alternate embodiment, the magnetic core encapsulated in said resin part of said magnetic armature wedge structure 210 comprises a plurality of sticks 28 of magnetic material, each said stick being oriented so that a longitudinal axis thereof is generally transverse to each of said length dimension and said thickness dimension of said wedge (page 5, lines 4-8; Fig. 3-4).

In a further alternate embodiment, the magnetic core encapsulated in said resin part of said magnetic armature wedge structure 310 comprises a plurality of laminated

plates 30 of magnetic material, each said plate being oriented in a direction generally transverse to said length dimension (page 5, lines 8-10; Fig. 5-6).

In yet another embodiment, the magnetic core encapsulated in said resin part of said magnetic armature wedge structure 410 comprises an elongated centrally disposed magnetic core 32 made from mixing resin and ferromagnetic particles (page 5, lines 11-14).

In an exemplary embodiment, the magnetic core has a generally circular cross-sectional shape (page 6, lines 15-16).

The magnetic core is preferably comprised of silicon-iron for increasing slot leakage reactance (page 4, line 24 – page 5, line 10). Further, when the magnetic core is formed from discrete components, the discrete components are preferably coated with a non-metallic material prior to being embedded in the molded body (page 5, lines 6-8).

6. ISSUES

Whether each of claims 1 and 10-11 is patentable under 35 USC 102(b) as not anticipated by Watanabe et al (USP 4,761,581).

Whether claim 20 is patentable under 35 USC 102(b) as not anticipated by Ishihara (JP 357189542).

Whether each of claims 2 and 28-29 are patentable under 35 USC 103(a) as not having been obvious from Watantabe et al in view of Ishihara.

7. GROUPING OF CLAIMS

Claim 1 stands or falls alone.

Claims 2 stands or falls alone.

Claims 10 and 28 stand or fall together.

Claims 11 and 29 stand or fall together.

Claim 20 sands or falls alone.

In the event the Examiner belatedly includes claim 30 in one of the above-stated rejections, then Claim 30 stands or falls alone.

8. ARGUMENT

Claims 1 and 10-11 are not anticipated by Watanabe et al.

Anticipation under Section 102 of the Patent Act requires that a prior art reference disclose every claim element of the claimed invention. See, e.g., Orthokinetics, Inc. v. Safety Travel Chairs, Inc., 806 F.2d 1565, 1574 (Fed. Cir. 1986). While other references may be used to interpret an allegedly anticipating reference, anticipation must be found in a single reference. See, e.g., Studiengesellschaft Kohle, G.m.b.H. v. Dart Indus., Inc., 726 F.2d 724, 726-27 (Fed. Cir. 1984). The absence of any element of the claim from the cited reference negates anticipation. See, e.g., Structural Rubber Prods. Co. v. Park Rubber Co., 749 F.2d 707, 715 (Fed. Cir. 1984). Anticipation is not shown even if the differences between the claims and the prior art reference are insubstantial and the missing elements could be supplied by the knowledge of one skilled in the art. See, e.g., Structural Rubber Prods., 749 F.2d at 716-17.

It is respectfully submitted that contrary to the Examiner's characterization of Watanabe, Watanabe does not identically disclose nor suggest the invention of applicant's independent claim 1. In this regard, claim 1 is specifically limited to a

magnetic assembly that comprises a magnetic armature wedge structure including a molded body having a magnetic core and a resin part encapsulating the magnetic core. It is further recited that the magnetic core is disposed to extend along substantially an entire length of the molded body.

As clearly shown in Figure 2 of Watanabe, Watanabe's magnetic wedge consists of a plurality of magnetic strips disposed so as to be in spaced, non-contacting relation from one another, uniformly distributed throughout the wedge and at a predetermined inclination angle θ to the depth direction of the stator winding slot, and a plastic member for molding the magnetic member. In column 3, lines 44-53 of Watanabe, it is stated "The inclination angle θ of the magnetic strips 6a, 6b should be as large as possible from the view point of the magnetic characteristic. However, it should be noted that the magnetic strips must not be inclined so large that both ends of the magnetic strip extend over the core tooth portions 1a and 2b at both sides of the slot 2."

It is evident that Watanabe does not provide nor in any way suggest a magnetic core disposed to extend along substantially an entire length of the molded body and a resin part encapsulating such a magnetic core. On the contrary, Watanabe teaches a plurality of discrete and non-contacting metal strips or rods that are uniformly disposed throughout the entirety of the Watanabe wedge. Moreover, each of the strips or rods provided in Watanabe is disposed at an angle θ to the vertical direction of the wedge. Thus, there is no teaching of a magnetic core extending along substantially the entire length of the wedge.

The Examiner's suggestion that components 6a as shown in Figure 1 extend along "the entire length" in the "radial direction" of the wedge is not well taken. Claim 1 recites a core extending along the length of the molded body. "Length" is defined in the Random House Webster's College Dictionary as "the longest extent of anything as measured from end to end." Because the length of the prior art wedge "in a radial

direction" is not the wedge's longest extent measured from end to end, the Examiner's suggestion that components 6a extend along the entire length of the wedge, as recited in applicant's claims, is completely without merit and improper. It is well understood that length refers to longitudinal length unless specifically characterized otherwise. It is therefore respectfully submitted that Watanabe does not anticipate claim 1.

It is further respectfully submitted that Watanabe does not in any way anticipate the subject matter of applicant's claim 10. Claim 10 specifies that the magnetic core comprises an elongated centrally disposed magnetic core made from mixing resin and ferromagnetic particles. There is no teaching in Watanabe of a centrally disposed magnetic core much less a core made from mixing resin and ferromagnetic particles. The only teaching of magnetic material in Watanabe is the teaching of the discrete magnetic strips 6a and 6b. No fair reading of Watanabe would teach or suggest the mixture of resin and ferromagnetic particles to produce a centrally disposed magnetic core. Thus, the Examiner's rejection in this regard cannot properly be sustained.

Claim 11 depends from claim 10 and requires that the centrally disposed core made from mixing resin and ferromagnetic particles have a circular cross-section. It is unclear from the Examiner's rejection what is considered to be a "magnetic core" in Watanabe. If it is strips 6a and 6b, they are not formed from a mixture of resin and ferromagnetic particles and are not centrally disposed to extend along the length of the molded body. It is therefore submitted that the Examiner's rejection based on Watanabe is unfounded.

It is further respectfully submitted that the invention provides significant and unanticipated advantages over Watanabe. As previously asserted in the response filed October 24, 2002, because the magnetic core part which in one embodiment, as recited in claim 10, is made from a mixture of ferromagnetic material and resin, is not designed to withstand electromagnetic forces, the magnetic volumetric mixing ratio can be very high (greater than 60%) to effectively enhance the magnetic field. The other part of

the molded body comprising, e.g., high-strength resin encapsulating material, is provided to advantageously withstand forces acting on the wedge.

Watanabe in no way teaches or suggest the concept of encapsulating a magnetic core in a resin material but instead teaches only a structure where an inclined magnetic strips are uniformly distributed throughout the entirety of the molded wedge. Accordingly, claims 1 and 10-11 are not anticipated by nor obvious from Watanabe. It is further respectfully noted that the magnetic flux in Watanabe is strongly influenced by the inclination angle θ of the magnetic strips. Because of these inclined strips, there are two components of the enhanced magnetic flux. Radial flux crossing the air gap between the rotor and the stator and circumferential flux crossing the stator winding slot. In contrast, the enhancement of the magnetic field according to the invention is determined by the magnetic volumetric mixing ratio. The enhanced magnetic flux is mainly in the circumferential direction crossing the winding slot. Additionally, the magnetic flux provided with the structure of the invention is much more uniform than that in Watanabe. Furthermore, from the standpoint of mechanical strength, the construction taught by Watanabe can withstand much less magnetic forces than is possible with the invention disclosed and claimed by applicants. This is because the provision of inclined strips as taught by Watanabe can greatly reduce the strength of the magnetic wedge.

For all the reasons advanced above, it is respectfully submitted that claims 1, 10 and 11 are not anticipated by Watanabe.

Also for the reasons advanced above, particularly with respect to claim 11, claim 30, which was not rejected over the prior art in the Examiner's final Official Action, is submitted to be patentable as not anticipated by nor obvious from Watanabe.

Claim 20 is not anticipated by Ishihara.

By careful review of the Ishihara patent, it is clear that this patent deals with a method of improving the wedge mounting workability. As show in Figures 5-8, Ishihara developed a concept of a two-piece magnetic wedge which includes a first part 12A which is a mixture of magnetic powder and resin and a second part 12B which is a mixture of magnetic powder and foaming resin. Parts 12A and 12B are put together at the mouth of the stator winding slot. Heating the parts causes the volume of part 12B to expand 2-10 times to fill all available spaces in the slot. As part 12B solidifies, the stator winding is locked within the slot.

From the standpoint of magnetic field enhancement, this design is very similar to Myers (USP 2,201,699) discussed in detail in the response filed October 24, 2002. The main disadvantage of this design is that the magnetic flux is non-uniform and effective flux density is low. In any event, it is respectfully submitted that Ishihara does not teach or fairly suggest the assembly claimed in claim 20 comprising a magnetic armature wedge structure and further comprising a magnetic wedge slide adjacent the armature wedge structure. Ishihara teaches only a wedge formed in two parts and, contrary to the Examiner's statement that part 12B is a wedge slide, part 12B is explicitly characterized by Ishihara as a resin wedge. It is therefore respectfully submitted that the Examiner has mischaracterized Ishihara and Ishihara does not anticipated nor otherwise fairly suggest the invention recited in claim 20.

Claims 2 and 28-29 are not obvious from Watanabe et al in view of Ishihara.

Claims 2 and 28-29 are submitted to be patentable over Watanabe or Ishihara for the reasons advanced above. The Examiner's attempted combination of Watanabe and Ishihara does not overcome the deficiencies of the individual references noted above. Indeed, neither Watanabe nor Ishihara teach or in any way suggest a magnetic core disposed to extend along substantially an entire length of a wedge structure molded body and encapsulated in a resin part. Both these references also fail to anticipate or any way suggest a magnetic core comprising a centrally disposed

magnetic core made from mixing resin and ferromagnetic particles and similarly fail to teach or suggest such a magnetic core having a circular cross-section. Indeed, Ishihara's teaching of a wedge part comprising a resin mixed with a magnetic particles relates to an entirely uniform distribution of particles in the molded body and there is no teaching or suggestion whatsoever of a magnetic core that is encapsulated in resin, as claimed. For the same reasons, there is no teaching or suggestion whatsoever of a centrally disposed magnetic core comprised of a mixture of resin and magnetic particles and having a circular cross section.

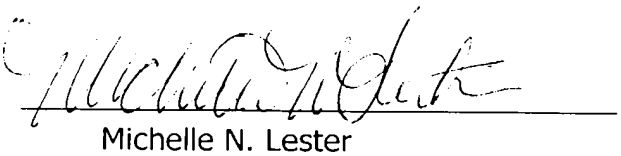
Thus, for the reasons set forth above that claims 1, 10 and 11 are not anticipated by Watanabe, it is respectfully submitted that claims 2, 28 and 29, respectively, are not anticipated by nor obvious from the combination of Watanabe and Ishihara.

CONCLUSION

For all the reasons advanced above, it is respectfully requested that the Examiner be reversed, that this appeal be granted, and that all claims 1-11 and 20-30 be allowed.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: 

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APPENDIX A

9. CLAIMS ON APPEAL

1. A magnetic assembly for being received in an armature slot for retaining armature coil components therewithin, said assembly having a longitudinal dimension generally parallel to an axis of said armature slot and a thickness dimension in a direction generally perpendicular to said longitudinal dimension and aligned in a depth direction of said armature slot, said magnetic assembly comprising:

a magnetic armature wedge structure including a molded body having a magnetic core and a resin part encapsulating said magnetic core, said magnetic core disposed to extend along substantially an entire length thereof.

2. A magnetic assembly as in claim 1, further comprising a magnetic wedge slide adjacent said magnetic armature wedge structure, between said magnetic armature wedge structure and said armature coil components, said magnetic wedge slide being formed from resin having ferromagnetic particles distributed therethrough.

3. (objected to/allowable)

4-9. (withdrawn/non-elected species)

10. A magnetic assembly as in claim 1, wherein said magnetic core encapsulated in said resin part of said magnetic armature wedge structure comprises an elongated centrally disposed magnetic core made from mixing resin and ferromagnetic particles.

11. A magnetic assembly as in claim 10, wherein said magnetic core has a generally circular cross-sectional shape.

20. A magnetic assembly for being received in an armature slot for retaining armature coil components therewithin, said assembly having a longitudinal dimension generally parallel to an axis of said armature slot and a thickness dimension in a

direction generally perpendicular to said longitudinal dimension and aligned in a depth direction said armature slot, said magnetic assembly comprising:

a magnetic armature wedge structure including a molded body of a resin material having a magnetic material embedded therewithin, said magnetic material being embedded in said molded body so as to be disposed along substantially an entire length thereof, and further comprising a magnetic wedge slide adjacent said magnetic armature wedge structure, between said magnetic armature wedge structure and said armature coil components, said magnetic wedge slide being formed from resin having ferromagnetic particles distributed therethrough.

21. (objected to/allowable)

22-27. (withdrawn/non-elected species)

28. A magnetic assembly as in claim 20, wherein said magnetic material embedded in said molded body of said magnetic armature wedge structure comprises a magnetic core made from mixing resin and ferromagnetic particles that is encapsulated in resin.

29. A magnetic assembly as in claim 28, wherein said magnetic core has a generally circular cross-sectional shape.

30. A magnetic assembly for being received in an armature slot for retaining armature coil components therewithin, said assembly having a longitudinal dimension generally parallel to an axis of said armature slot and a thickness dimension in a direction of generally perpendicular to said longitudinal dimension and aligned in a depth direction said armature slot, said magnetic assembly comprising:

a magnetic armature wedge structure including a molded body having a magnetic core and a resin part encapsulating said magnetic core, said magnetic core disposed to extend along substantially an entire length thereof, wherein said magnetic

core encapsulated in said molded body of said magnetic armature wedge structure comprises an elongated magnetic core made from mixing resin and ferromagnetic particles, and wherein said magnetic core has a generally circular cross-sectional shape.